

EXPERIMENTAL STUDY OF PBAR BUNCH ROTATION EFFICIENCY VERSUS MAIN RING BUNCH LENGTH

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An experimental measurement of the antiproton source bunch rotation efficiency versus the main ring bunch length was made. The bunch rotation efficiency was measured using the Debuncher schottky signal. The main ring bunch length was measured with the mountain range display on the TV system (Main Ring South channel 6). The bunch length (at the base) was "eyeballed" from the TV picture, and may be subject to some systematic uncertainties depending on who was measuring the length. A microprocessor takes a schottky spectrum and computes the bunch rotation efficiency. The ratio of power in a frequency span corresponding to 0.2% $\Delta P/P$ around the central momentum to the total power corresponding to 2.4% $\Delta P/P$. This result (D:FFTEFF) was histogrammed. Typically 50-100 pulses were accumulated and the mean was determined to less than 0.5% (statistical) accuracy.

Dave Wildman varied the main ring bunch rotation timing to produce the various bunch lengths. We noticed that there was a substantial pulse to pulse variation not only in the bunch width but also in the bunch center relative to the trigger (which is presumably locked to the main ring r.f.) These variations, unless controlled, probably constitute a lower limit on the main ring bunch size. We were not able to reduce the bunch length below 1.5 nsec. Dave Wildman said that the length had been somewhat shorter in the past and speculated that perhaps the main ring longitudinal emittance is larger now than it had been previously.

The results of the experiment are plotted in figure 1. They suggest that the bunch rotation efficiency might be better if we could obtain main ring bunch lengths of 1 nsec or better.

Pbar Bunch Rotation Efficiency

vrs Main Ring Bunch Length

